

# **ProRail**

## **Putting energy in switch heating**

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# ProRail

May, 20, 2009: MIT

Revised MIT climate model sounds alarm

*New analysis shows warming could be double previous estimates in the next century, which twice as severe as previously estimated by MIT six years ago.*

Global poll finds 73% want higher priority  
for climate change (The Guardian, July, 30, 2009)

*Britons among the most enthusiastic about action to stop global warming, while Americans among least willing to put environment first, according to global public opinion poll*



## Energy saving program Dutch Railways

- Energy consumption of the Dutch Railway sector is about 13.300 TJ. This is 3% of the national energy consumption.
- More than 90% of the energy consumption in the Dutch railsector is used for traction. About 1100 TJ is used for non-traction.
- In 1997 the Dutch Railways and the minister of public transport closed an agreement to improve the energy efficiency with 20% till 2010.

# ProRail

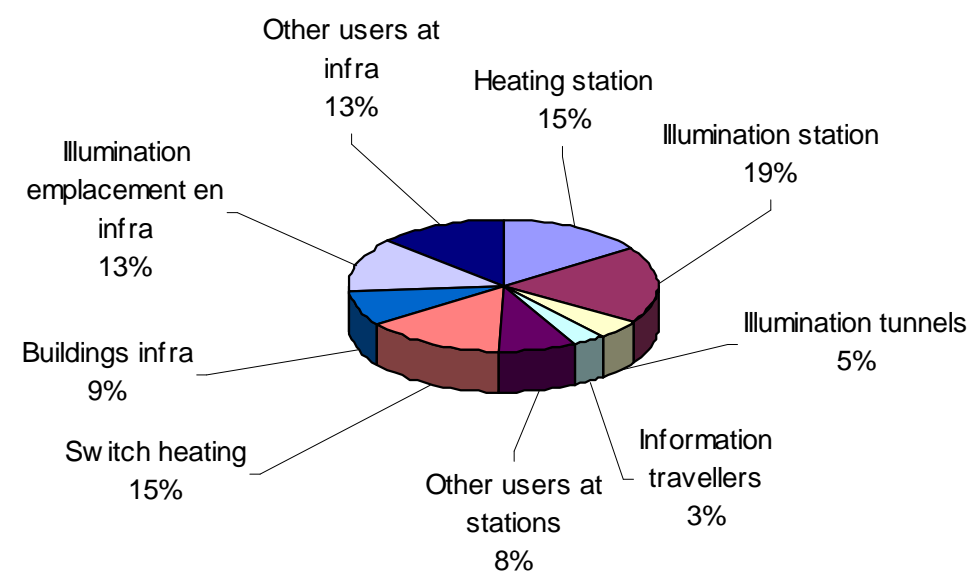
## A few figures

ProRail maintains 6.583 km track and about 120 railway yards. ProRail manages 392 stations. There are 80 new stations under constructions or planned to be build before 2016. A growth of 20%.

Use of energy 2008:

- 95 mln kWh electricity (22% green)
- 8 mln m<sup>3</sup> natural gas
- 1100 TeraJoule
- 45.000 ton CO<sub>2</sub>

**Figur 2: energy consumption ProRail / NS poort stations per category percentage of TJ**



## Ambitions ProRail

- ProRail emits in 2012 12% less CO<sub>2</sub> than in 1997.
- Every two year ProRail makes an energy saving plan for the infrastructure and railway stations. At this moment EBP4 2009 – 2010.
- In 2020 we improve our energy efficiency with 30% compared to 2005.
- Goals EBP4:
  - anchor improvement energy efficiency in the organization
  - carry out feasibility studies and pilots
  - improve energy registration and measure energy consumption
  - take measures in regular maintenance
- Long-term goals are:
  - improving the energy-efficiency with more than 2% per year
  - buying 100% green electricity
  - encouraging contractor, suppliers and engineers to develop more energy efficient and sustainable products.

# ProRail

## Main projects 2009 – 2010

- Research project to save energy used by switch heating and thermal insulation of switches in cooperation with GVB Amsterdam and SenterNovem. TU Eindhoven and MeteoConsult are the researching partners.
- Develop an assessment tool for sustainable stations
- Dimming light in tunnels (savings 1.1 mln kWh/yr)
- Several other studies:
  - energy neutral station
  - improve the energy efficiency of platform lighting with 30%
  - energy efficient escalators
  - CO<sub>2</sub> footprint ProRail



# ProRail

## Research project switch heating

- Switches are responsible for 15% of the energy consumption of ProRail and almost 20% of the greenhouse gas emissions.
- Natural gas is the primary energy source for Dutch switch heating.
- Three type of switch heating:
  - burner pipe (gas, 45%)
  - electric heating elements (25%)
  - central heating (gas,heatpump or electricity, 30%).
- Control with weather stations.
- With GVB Amsterdam, SenterNovem, TU Eindhoven.
- Using a computer model of a switch to determine the important factors.
- Test program with a complete switch in a refrigerated warehouse.
- Focus on improving insulation and control of the heating.



# ProRail

## Assumptions that are being tested

- It is possible to reduce the energy consumption of electric heated switches with 20% using a control based on weather forecast.
- Insulation of switches can reduce the energy consumption with another 20%.
- A more logical placement of heating elements, or splitting one big element in two separate ones, delivers the heat on the place where it's needed. This reduces energy consumption.
- Surface improving measures, improve the transport of heat from the heating element to the rail, resulting in energy saving.
- All these measures do not affect the maintainability and reliability of the switches.
- Payback time of the measures do not exceed 10 years.



# ProRail

## Test program

1. ProRail and GVB Amsterdam declare the test program, based on the previous assumptions.
2. TU Eindhoven and MeteoConsult make a computer model, to simulate this test program.
3. The results from the model are verified in the refrigerated warehouse.
4. The test results are improving the computer model.



# ProRail

## Insight into the testing method



Worst case weather scenario by Meteo Consult

The meteorological quantities of this scenario are being fed to:

An simulating computer model,  
made by TU Eindhoven.

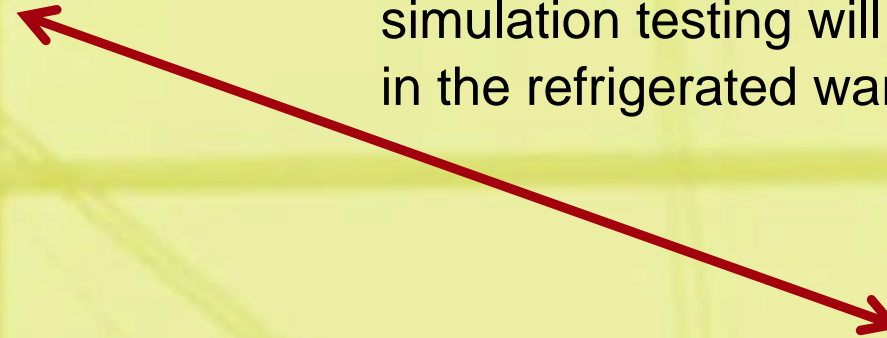


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## Insight into the testing method



The test results of the computer simulation testing will be verified in the refrigerated warehouse test.



# ProRail

## What do ProRail and GVB get?

- A verification of possible energy reducing measures, including the percentage of energy reduction and an estimation of the economic payback.
- An insight into the application, and the practicality of those energy reducing measures.
- An estimation of the fact that the measures taken will not affect the availability, maintainability and reliability of the system.



# ProRail

## Next step

- Implementation of the results into our rail system.
- Tests in real situations (maybe in other – colder – countries)
- Opportunities for and tests with switch heating which are using heat pumps

## QUESTIONS ??

*Information about the research project switch heating:*

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